IN THE SPECIFICATION

Please amend the paragraph previously inserted at column 1 between the Title and the Background of the Invention to read as follows:

This is a continuation application of reissue application no. 08/396,981 which issued as RE 36,445 on December 14, 1999 and which was a reissue of United States Patent No. 5,235,581 issued August 10, 1993. The following are related continuation reissue applications of the present application: application no. 09/420,603 filed October 19, 1999, application no. 09/609,699 filed November 22, 1999, application no. 09/460,221 filed December 13, 1999, application no. 09/460,222 filed December 13, 1999, application no. 09/460,223 filed December 13, 1999, application no. 10/677,167 filed October 2, 2003, application no. 10/677,168 filed October 2, 2003, and application no. 10/693,810 filed October 23, 2003.

Please amend the paragraph beginning at column 4, line 5 to read as follows:

In FIGS. 1 to 3A and 3B, reference numeral 1 denotes a first or second optical disc. Thicknesses of disc substrates of both of the first and second optical discs are different. Reference numeral 2 denotes a cartridge which encloses the optical disc 1 and protects. The cartridge 1 is made of plastics or the like.

Reference numeral 3 denotes a first optical head and 5 indicates a second optical head. Each of the optical heads is constructed by a converging optical [system] unit comprising: an objective lens; a semiconductor laser, a photo detector; a beam splitter; and the like (all of the above components are not shown). Each of the optical head detects an information signal, a focusing error signal, and a tracking error signal which have been recorded on the optical disc 1 on the basis of an intensity or an intensity distribution of the reflected lights of a laser beam irradiated onto the optical disc 1 and generates a photo detection signal to the outside. An information signal is recorded onto or erased from the optical disc 1 by modulating an intensity of the laser beam. Both of the optical heads have bases to hold the above optical devices and actuators. A reproduction information signal, a focusing error signal, and a tracking error signal which arc generated from the photo detector of the first optical head 3 are expressed by S1, F1, and T1, respectively. Similar signals which are generated from the photo detector of the second optical [disc] head 5 are also expressed by S2, F2, and TS, respectively. Reference numeral 4 denotes a first linear motor which is arranged below the optical disc 1 and moves the first optical head 3 in the radial direction of the disc in parallel with the disc surface. Reference numeral 6 denotes a second linear motor which is arranged

F3 3

below the optical disc 1 so as to face the first linear motor 4 and moves the second optical head 5 in a manner similar to the first optical head 3.

Please amend the paragraph beginning at column 6, line 51 to read as follows:

F4 4

Therefore, the second optical head 5 irradiates the laser beam and converges onto an information track on the optical disc 1 without an aberration. Simultaneously, the second optical head 5 detects the reflected lights from the disc and generates the information signal S2, focusing error signal F2, and tracking error signal T2. Those signals are supplied through the first selector 10 to the respective circuits. That is, the signal S2 is supplied to the spindle control circuit 17 and signal processing circuit 19. The signal F2 is supplied to the focusing control circuit 13. The signal T2 is supplied to the tracking control circuit 11. The tracking control circuit 11 produces the tracking actuator driving signal in accordance with the signal T2 and supplies to the actuator of the second optical head 5 through the second selector 12, thereby eliminating the tracking error. In a manner similar to the above, the focusing control circuit 13 also produces the focusing actuator driving signal in accordance with the signal F2 and supplies to the actuator of the second optical head 5 through

the third selector 14, thereby eliminating the focusing error. The linear motor control circuit 15 generates the driving current to the linear motor 6 in response to the control signal from the system controller 22, thereby moving the second optical head 5 in the inner or outer rim direction of the optical disc 1. The spindle control circuit 17 extracts a clock component from the information signal S2 and controls the spindle motor 18, thereby rotating the optical disc 1 at a constant linear velocity (CLV) or a constant angular velocity (CAV) or the like. The signal processing circuit 19 executes signal processes such as demodulation, decoding, and the like to the information signal S2 in the reproducing mode and generates to the outside as audio or video signals or the like. On the other hand, the signal processing circuit 19 executes signal processes such as encoding, modulation, and the like to the audio or video signals or the like which have been supplied from the outside in the recording mode and generates to the LD driving circuit 20 as a recording signal. Until the cartridge 2 is [loaded] <u>unleaded</u>, the second optical head 5 records or reproduces the information signal onto/from the second optical disc 1.

Please amend the paragraph beginning at column 7, line 25 to read as follows:

On the other hand, in the case where the cartridge 2 enclosing the first optical disc has been loaded into the optical disc apparatus of the embodiment, since the discrimination hole 7 is closed, the photo diode 9 doesn't detect the transmission light. Therefore, the system controller 22 determines that the disc in the cartridge 2 is the foregoing first optical disc. Thus, the controller 22 generates control signals to the first to fifth selectors 10, 12, 14, 16, and 21 so as to select the terminals A on the first optical head side. Therefore, the semiconductor laser of the first optical head 3 is selected as an output destination of the driving current which is supplied from the LD driving circuit 20. The photo detector of the first optical head 3 is selected as an input destination of the tracking control circuit 11, focusing control circuit 13, spindle control circuit 17, and signal processing circuit 19. The actuator of the first optical head 3 is selected as an output destination of the actuator driving signals of the tracking control circuit 11 and focusing control circuit 13. The first linear motor 4 is selected as an output destination of the driving current of the linear motor control circuit [17] 15. Therefore, the first optical head 3 irradiates the laser beam and converges onto the information track on the optical disc 1 without an aberration. Simultaneously, the reflected lights from the disc are detected and generated as the information signal S1, focusing

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error signal F1, and tracking error signal T1. The above signals are supplied through the first selectors 10 to the respective circuits That is, the signal S1 is supplied to the spindle control circuit 17 and signal processing circuit 19. The signal F1 is supplied to the focusing control circuit 13. The signal T1 is supplied to the tracking error detecting circuit 11. The subsequent operations are similar to those in the case of the second optical disc mentioned above.

F5

Please amend the paragraph beginning at column 7, line 61 to read as follows:

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In the case where the objective lens of the second optical head is a lens of a high NA and a short [operating] working distance, it is necessary to set an interval between the second optical head 5 and the surface of the optical disc 1 to be fairly narrower than that in the case of the first optical head [5] 3. Therefore, while the first optical disc is loaded, the controller 22 controls the second linear motor 6, thereby moving the second optical head 5 to the outside of the disc surface as shown in FIG. 2. Due to this, it is possible to prevent that the objective lens of the second optical head 5 collides with the optical disc 1 due to a surface oscillation.

F6

Please amend the paragraph beginning at column 10, line 67 to read as follows:

Among the foregoing component elements, the first objective lens 36 constructs the first converging optical system mentioned in the second embodiment of the invention together with the first semiconductor laser 32, the first collimating lens 33, the first beam splitter 34, and the first mirror 35. The second objective lens 46 constructs the second converging optical system together with the first semiconductor laser 32, the first collimating lens 33, the first beam splitter 34, and the first mirror 35 which are commonly used for the first converging optical system. The first converging optical system is mounted onto a common base (not shown) together with the first and second shutters [5] 51 and 52, thereby constructing the fourth optical head 50. Since the lens holder 39 and the actuator 40 have the same construction as those in the third optical head 30 in the second embodiment, their descriptions are omitted here. The fourth optical head 50 is attached to the first linear motor 4.

Please amend the paragraph beginning at column 12, line 7 to read as follows:

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FIGS. 9A and 9B show a detailed constructional diagram of an optical head of an optical disc apparatus in the fourth embodiment of the invention. In FIG. 9A, since the optical disc 1, first semiconductor laser 32, first collimating lens 33, first beam splitter 34, second objective lens 46, first detecting lens 37, and first photo detector 38 are constructed in a manner similar to those in the foregoing fourth optical head 50, their descriptions are omitted here. Reference numeral 56 denotes a lens holder to hold the second objective lens 46; 57 an actuator to which the lens holder 56 is attached; 54 a wave front correcting lens attached to a slider 55, which will be explained hereinlater, so that the optical axis is in parallel with the optical axis of the second objective lens 46; and 55 the slider which supports the wave front correcting lens 54 and is arranged so as to transverse in the plane which is perpendicular to the light flux between the first beam splitter 34 and the second objective lens 46, thereby enabling the wave front correcting lens 54 to be moved in such a plane. Moreover, such a movable range is set to a position (shown by P1 in the diagram) where the wave front correcting lens 54 is perfectly deviated out of the light flux or a position (shown by P2 in the diagram) where the optical axis of the [slider 55] <u>wavefront correcting lens 54</u> coincides with the optical axis of the second objective lens 46. The above-mentioned component elements are

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attached to a base (not shown) and construct a fifth optical head 53

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Please amend the paragraph beginning at column 14, line 31 to read as follows:

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In FIG. 11, reference numeral 1 denotes the same optical disc as that described in the foregoing embodiments. Reference numeral 200 denotes an information track formed on the optical disc 1. Reference numeral 61 denotes a substrate formed by $LiNbO_3$ or the like. The substrate 61 is attached to a head base through a focusing actuator and a tracking actuator and constructs the sixth optical head 60 together with them. Since the focusing actuator, tracking actuator, and head base which have conventionally been well known can be used as those components, their detailed description and the drawings are omitted here. Reference numeral 62 denotes an optical waveguide formed on the substrate [51] <u>61</u> by Ti diffusion or the like; 63 a first semiconductor laser coupled to an edge surface of the optical waveguide 62; and 64 a first waveguide lens arranged on an optical path of the waveguide light which has been emitted from the first semiconductor laser 63 and entered the optical waveguide [61] <u>62</u>. For instance, a Fresnel lens formed by an electron beam lithography can be used as a lens 64. Reference numeral 65 denotes a first converging grating coupler formed on the

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optical path of the parallel waveguide light. The coupler 65 emits the waveguide light to a position out of the optical waveguide 62 and converges onto the optical disc 1. The first converging grating coupler 65 is a grating having a chirp (irregular period) by a curve formed on the waveguide by electron beam direct drawing or the like. Reference numeral 66 denotes a first beam splitter which is arranged between the first waveguide lens 64 and the first converging grating coupler 65 and separates the waveguide light which has been returned into the optical waveguide 62 through the first converging grating coupler 65 after it had been reflected by the optical disc 1. Reference numeral 67 denotes a first waveguide converging lens which is arranged on the optical path of the return waveguide light which has been separated by the first beam splitter 66 and converges the return light. Reference numeral 68 denotes a first photo detector which is coupled to the side surface of the optical waveguide 62 and detects the return waveguide light which has been converged by the first waveguide converging lens 67.

Please amend the paragraph beginning at column 15, line 6 to read as follows:

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Similarly, reference numeral 69 denotes a second semiconductor laser coupled to the edge surface of the optical waveguide 62; 70 a second waveguide lens arranged on the optical path of the waveguide light which has been emitted from the second semiconductor laser 69 and entered the optical waveguide [61] 62; and 71 a second converging grating coupler formed on the optical path of the parallel waveguide light. The coupler 71 emits the waveguide light to a position out of the optical waveguide 62 and converges onto the optical disc 1. Reference numeral 72 denotes a second beam splitter which is arranged between the second waveguide lens 70 and the second converging grating coupler 71 and separates the waveguide light which has been returned into the optical waveguide 62 through the second converging grating coupler 71 after it had been reflected by the optical disc 1. Reference numeral 73 denotes a second waveguide converging lens which is arranged on the optical path of the return waveguide light which has been separated by the second beam splitter 72 and converges the return waveguide light. Reference numeral 74 denotes a second photo detector which is coupled to the side surface of the optical waveguide 62 and detects the return waveguide light converged by the second waveguide converging lens 73.

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